

Amendments to the Drawings:

The attached sheet of drawings includes changes to FIG. 1. This sheet replaces the original sheet, each of which only includes FIG. 1.

Attachment: Replacement Sheet 1/4

5 Annotated Sheet 1/4 Showing Changes

Figure 1 on sheet 1/4 has been amended to indicate the free-ended outer edge 32 of the blade, as required by the examiner in the Office Action. The figure has also been amended to correct a drawing error. In particular, a trailing edge 31 has been drawn on the blade (see, annotated sheet), a
10 reference number has been added to free edge 32, an extraneous line has been removed from the drawing (see, annotated sheet), and the lead line for reference number 12 has been adjusted to avoid overlapping the trailing edge, as indicated on the annotated sheet.

No new matter has been added by these amendments. More
15 particularly, the applicant notes that Figure 2 is indicated in the specification as a close up of Figure 1, and it already depicts the features as corrected in Figure 1. Moreover, the specification indicates that the tip 8 of the hub is at the trailing edge (see, page 4, line 3).

Remarks:

This application has been reviewed carefully in light of the Office Action mailed March 5, 2009. The specification was objected to as failing to provide proper antecedent basis for the claimed subject matter. Claims 13
5 and 14 were objected to for informalities. Claims 16-17 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

To aid in efficiently addressing the numerous rejections that reference the same or similar references, the applicant will identify the various substantive rejections as different grounds of rejection:

10 Ground 1: Claims 1, 15/1 and 18 were rejected under 35 U.S.C. 102(b) as being anticipated by Mitsubori et al., U.S. Pat. No. 5,246,335.

Ground 2: Claims 1, 4, 5, 6, 9, 11, 12/6, 13/6, 14/6, 15/6, 12/9, 13/9, 14/9, 12/4, 13/4, 14/4, 15/1, 15/4, 15/11 and 18 were rejected under 35 U.S.C. § 103(a), as being unpatentable over Yoshinaga et al., U.S. Pat. Num.
15 4,395,197, in view of Jones, U.S. Pat. No. 3,893,787.

Ground 3: Claims 1, 4, 5, 9, 11, 13/9, 14/9, 13/4, 14/4, 15/1, 15/4, 15/11 and 18 were rejected under 35 U.S.C. § 103(a), as being unpatentable over Fabri et al., U.S. Pat. Num. 3,824,029, in view of Jones.

Ground 4: Claims 16 and 17 were rejected under 35 U.S.C. § 103(a), as
20 being unpatentable over Fabri et al. and Jones, and further in view of Trumpler, U.S. Pat. No. 2,471,174.

Ground 5: Claims 1, 4, 5, 6, 9, 11, 12/6, 13/6, 14/6, 15/6, 12/9, 13/9, 14/9, 12/4, 13/4, 14/4, 15/1, 15/4, 15/11 and 18 were rejected under 35 U.S.C. §

103(a), as being unpatentable over Yoshinaga et al., U.S. Pat. Num.
4,395,197.

Ground 6: Claims 1, 4, 5, 9, 11, 13/9, 14/9, 13/4, 14/4, 15/1, 15/4, 15/11
and 18 were rejected under 35 U.S.C. § 103(a), as being unpatentable over
5 Fabri et al.

The above-described rejections are addressed as follows.

I. Objection to the Specification

The specification was objected to as failing to provide proper
antecedent basis for the claimed subject matter. The applicant thanks the
10 examiner for suggesting amendments to the specification, and has
amended the specification accordingly. The applicant respectfully requests
the objections to the specification be withdrawn.

II. Amendments to the Drawings

In conjunction with the suggested amendments to the specification,
15 the applicant has added appropriate reference numbers to the drawings.
Additionally, a drawing error was corrected, as described above in the
description of the amendments to the drawings. No new matter was added
by the addition of reference numbers and the correction. The applicant
respectfully requests the amendments to the drawings be accepted.

20 III. Claim Objections

The applicant thanks the examiner for suggesting amendments to
claims 13 and 14. The informalities of claims 13-14 have been amended,

as suggested by the examiner. The applicant respectfully requests the objection to the claims be withdrawn.

IV. § 112 Rejection

Claims 16 and 17 have now been amended. In figure A, below, the applicant depicts a discontinuity under claims 1 and 16 and 17 at the trailing edge of a blade. The discontinuity shown is the one depicted in Fig. 4d of the application.

Per the last clause of claim 1, figure A depicts a discontinuity forming a downstream-facing blocking face 101 adapted to impede an upstream flow of gas between the shroud and the wheel, the blocking face extending across the gas flow path to form a sharp edge 105 connecting the blocking face to a smoothly curving surface 107 along the gas flow path upstream of the blocking face (i.e., upstream of the discontinuity).

Per claims 16 the blocking face 101 forms a second sharp edge 109 on an opposite side (i.e., a downstream side) of the blocking face 101 from the first sharp edge 105, the second sharp edge 109 connecting the blocking face 101 to a second smoothly curving surface 111 that is downstream of the blocking face (i.e., downstream of the discontinuity).

In claim 4, the above-described (first) discontinuity is differentiated from a second discontinuity (not shown below). In similar form to claims 16, claim 17 (which depends from claim 4) recites that the first-discontinuity blocking face 101 forms a second sharp edge 109 on an opposite side (i.e., a downstream side) of the first-discontinuity blocking face 101 from the first sharp edge 105 of the first-discontinuity blocking face 101, the second sharp edge 109 connecting the first-discontinuity blocking face 101 to a

second first-discontinuity smoothly curving surface 111 downstream of the first blocking face.

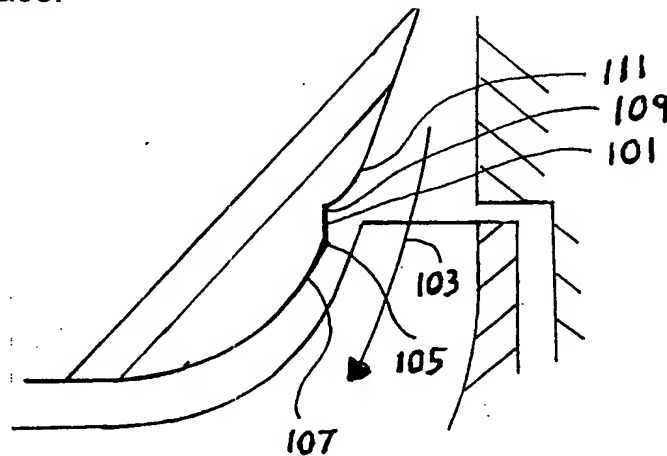


Figure A

In light of the amendments and the preceding discussion, the applicant respectfully requests the rejection of claims 16 and 17 under 35 U.S.C. § 112, be withdrawn.

V. Substantive Rejections

A. Ground 1: Mitsubori et al. Fails To Disclose The Claimed Series Of Features

Claim 1 recites a downstream-facing blocking face (e.g., see Figure A above, # 101) extending across the gas flow path to form a sharp edge (e.g., see Figure A above, # 105) connecting the blocking face to a smoothly curving surface (e.g., see Figure A above, # 107) along the gas flow path upstream of the blocking face. In other words, the sharp edge is between the downstream-facing blocking face and the smoothly curving surface upstream of the blocking face. For that to be the case, the sharp edge must be at the upstream side of the downstream-facing blocking face.

The applicant notes with appreciation the figures incorporated into the Office Action, which clarify the related discussion. The drawing from Mitsubori et al., as shown on page 9 of the Office Action, is replicated in part below as Figure B, with additional notations. In the drawing, the depicted discontinuity is made of a dimple having a single sharp edge 501 at the base of the dimple, an upstream-facing face 503 downstream of the sharp edge, and a downstream-facing face 505 upstream of the sharp edge. Mitsubori et al. fails to disclose a sharp edge connecting a downstream-facing blocking face to a smoothly curving surface upstream of the blocking face.

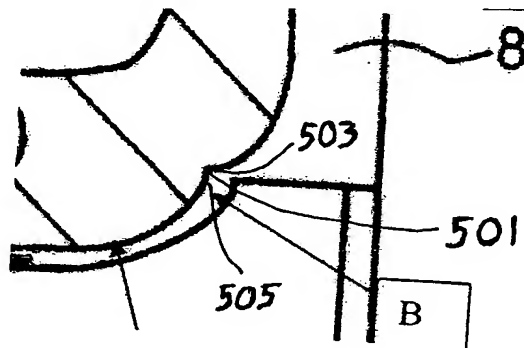


Figure B

Because the cited reference fails to disclose the features of claim 1, 15/1 and 18, the Office Action fails to assert a prima facie case of anticipation, and the applicant respectfully requests the rejections of claims 1, 15/1, and 18 under 35 U.S.C. § 102(b) be withdrawn.

B. Grounds 2 & 5: Yoshinaga et al. Fails To Disclose The Claimed Series Of Features

As previously discussed, claim 1 recites a discontinuity in the region of the trailing edge, wherein the discontinuity forms a sharp edge that is between a downstream-facing blocking face and a smoothly curving surface

upstream of the blocking face. For that to be the case, the sharp edge must be at the upstream side of the downstream-facing blocking face.

5 The Yoshinaga et al. patent clearly fails to disclose a sharp edge that connects a downstream-facing blocking face to a smoothly curving surface upstream of the blocking face. The only sharp edge in the identified region of Yoshinaga et al. connects a smoothly curving surface on it's upstream side to a face that points directly upstream.

10 Because the cited reference fails to disclose a discontinuity that forms a sharp edge that is between a downstream-facing blocking face and a smoothly curving surface upstream of the blocking face, the Office Action fails to assert a prima facie case of obviousness, and the applicant respectfully requests the rejections of all claims rejected under Grounds 2 and 5 be withdrawn.

15 C. Grounds 3, 4 & 6: Fabri et al. Fails To Disclose The Claimed Series Of Features

As previously discussed, claim 1 recites a discontinuity in the region of the trailing edge, wherein the discontinuity forms a sharp edge that is between a downstream-facing blocking face and a smoothly curving surface upstream of the blocking face. For that to be the case, the sharp edge must be at the upstream side of the downstream-facing blocking face.

25 The Fabri et al. patent clearly fails to disclose a sharp edge that connects a downstream-facing blocking face to a smoothly curving surface upstream of the blocking face. While it is not entirely clear which sharp edge is identified in Fabri et al., there is no sharp edge that connects a smoothly curving surface on the upstream side of the edge to a face that points at all downstream by any reasonable definition.

Because the cited reference fails to disclose a discontinuity that forms a sharp edge that is between a downstream-facing blocking face and a smoothly curving surface upstream of the blocking face, the Office Action fails to assert a prima facie case of obviousness, and the applicant
5 respectfully requests the rejections of all claims rejected under Grounds 3, 4 and 6 be withdrawn.

D. Grounds 2-6: Both Yoshinga et al. And Fabri et al. Fail To Disclose Blocking Faces In The Recited Gas Flow Path

Claim 1 recites a shroud mounted around the outer edges of the
10 compressor blades and defining a gas flow path between the shroud and the hub from a compressor inlet to a diffuser outlet, through which the blades rotate with respect to the shroud. Claim 1 further recites a shroud that forms a surface along the flow path, the surface being characterized by a profile that includes a relative discontinuity in the region of the trailing
15 edge, and further recites that the discontinuity forms a downstream-facing blocking face adapted to impede an upstream flow of gas between the shroud and the wheel, the blocking face extending across the gas flow path.

In asserting that these features are disclosed in the prior art, the Office Action identified alleged blocking faces in the Yoshinaga et al. and
20 Fabri et al. patents. In both cases, the identified faces were on a housing wall outside the shroud of a shrouded turbine wheel. In supporting this position, the Office Action (at the top of page 4) recites that the asserted discontinuities are clearly located along the gas flow path through which the compressor blades are rotating to pressurize the air. This assertion
25 completely discounts or ignores the meaning of the word shroud, which is a clear and precise term of art to a person skilled in the art of designing turbocharger turbines. Moreover, it attempts to call two wholly separate

regions of space a single gas flow path, even though one of them does not meet the recited limitations.

i) Shrouds Are Known In The Art

5 A person skilled in the art of designing turbocharger turbines is both well educated and knowledgeable in the standard parts of a turbine. One fundamental such part is a portion of the housing known as a shroud. This part may be machined from the housing, or it may be an insert to the outer shell of the housing.

10 A person skilled in the art recognizes that a turbine shroud is the wall that forces the air to pass through and between the blades so that the air pressure and momentum can force the blades to spin the turbine wheel in rotation. It is fundamental that a shroud is required for a turbine to function. Without a shroud, the air would rapidly escape from between the blades and the turbine would not function with any practical value. It is well known
15 that there are two kinds of wheels, one with a shroud incorporated in the wheel, and one with a shroud in an outer wall. When the shroud is incorporated in the wheel, the surrounding housing is not a shroud. The applicant notes that Yoshinaga et al. explicitly identifies a shroud 24 conforming to the meaning well understood by persons skilled in the art.

20 Neither the Yoshinaga et al. patent nor the Fabri et al. patent disclose a discontinuity along and extending across a flow path defined by a shroud.

ii) The Alleged Discontinuity Is Not In The Claimed Flow Path

While an examiner is directed to use the broadest interpretation of the claim language, the interpretation must be a reasonable interpretation.
25 Claim 1 defines a gas flow path between the shroud and the hub from a

compressor inlet to a diffuser outlet, through which the blades rotate with respect to the shroud. The Office Action appears to allege that “the gas flow path” includes both the path passing within the shroud and an entirely separate path extending through small gaps at either end of the shroud and passing outside the shroud between the shroud and the housing wall. That second pathway is not within the shroud, and no blades rotate through that pathway. A person skilled in the art would not reasonably consider a pathway of gas leaking around the ends of a rotating shroud to be part of a gas flow path between the shroud and the hub.

iii) The Alleged Discontinuity Is Not In The Claimed Flow Path

While an examiner is directed to use the broadest interpretation of the claim language, the interpretation must be reasonable to one of skill in the art. Claim 1 defines a gas flow path between the shroud and the hub from a compressor inlet to a diffuser outlet, through which the blades rotate with respect to the shroud. The Office Action appears to allege that “the gas flow path” includes both the path passing within the shroud and a path extending through small gaps at either end of the shroud and passing outside the shroud between the shroud and the housing wall. A person skilled in the art would not consider a pathway of gas leaking around the ends of a rotating shroud to be part of a gas flow path between the shroud and the hub.

Because the asserted discontinuities are not located along the claimed gas flow path between the shroud and the wheel, the Yoshinaga et al. and Fabri et al. patents fail to disclose the claimed discontinuities, and the Office Action therefore fails to assert a prima facie case of anticipation. The applicant respectfully requests the rejections of all claims, under Grounds 2-6, under 35 U.S.C. § 103(a), be withdrawn.

E. Grounds 2-6: Both Yoshinga et al. And Fabri et al. Fail To Disclose Downstream-Facing Blocking Faces

The Office Action recites that both Yoshinaga et al. and Fabri et al. disclose downstream facing faces, and notes that during examination
5 claims must be interpreted as broadly as their terms reasonably allow. Portions of the figures identified in the Office Action are reproduced below, with lines added showing the direction that walls in the vicinity of the trailing edges are facing. In each case these walls are facing directly across the
10 flow. There is no portion of the passageway that is angled to suggest that the wall is in a downstream-facing direction. Thus the applicant respectfully notes that there is no reasonable interpretation of the term downstream-facing face that applies to these figures.

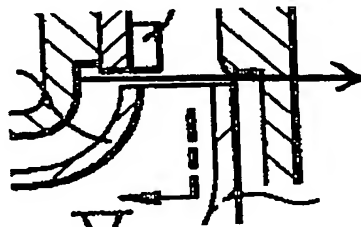


Figure C: Yoshinaga et al.

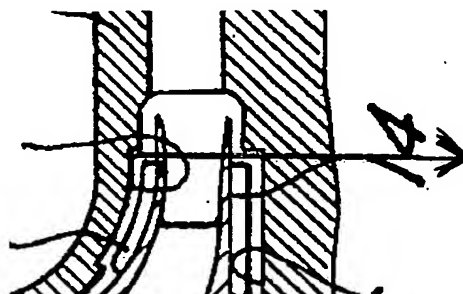


Figure D: Fabri et al.

Because the cited references fail to disclose a downstream-facing blocking face, the applicant respectfully requests the rejections of claims under Grounds 2-6 be withdrawn.

VI. Conclusion

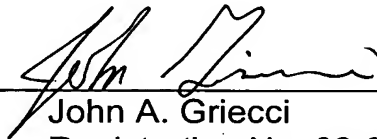
5 In view of the foregoing, the applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

10 Hua CHEN

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Fig.1.

